National Institute of Environmental Health Sciences

Climate change or urbanization? Impacts on a traditional coffee production system in East Africa over the last 80 years

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Abstract:

Global environmental changes (GEC) such as climate change (CC) and climate variability have serious impacts in the tropics, particularly in Africa. These are compounded by changes in land use/land cover, which in turn are driven mainly by economic and population growth, and urbanization. These factors create a feedback loop, which affects ecosystems and particularly ecosystem services, for example plant-insect interactions, and by consequence agricultural productivity. We studied effects of GEC at a local level, using a traditional coffee production area in greater Nairobi, Kenya. We chose coffee, the most valuable agricultural commodity worldwide, as it generates income for 100 million people, mainly in the developing world. Using the coffee berry borer, the most serious biotic threat to global coffee production, we show how environmental changes and different production systems (shaded and sun-grown coffee) can affect the crop. We combined detailed entomological assessments with historic climate records (from 1929-2011), and spatial and demographic data, to assess GEC's impact on coffee at a local scale. Additionally, we tested the utility of an adaptation strategy that is simple and easy to implement. Our results show that while interactions between CC and migration/urbanization, with its resultant landscape modifications, create a feedback loop whereby agroecosystems such as coffee are adversely affected, bio-diverse shaded coffee proved far more resilient and productive than coffee grown in monoculture, and was significantly less harmed by its insect pest. Thus, a relatively simple strategy such as shading coffee can tremendously improve resilience of agro-ecosystems, providing small-scale farmers in Africa with an easily implemented tool to safeguard their livelihoods in a changing climate.

Source: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3544928

Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Ecosystem Changes, Food/Water Security

Food/Water Security: Agricultural Productivity

Geographic Feature:

resource focuses on specific type of geography

Tropical

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Africa

African Region/Country: African Country

Other African Country: Kenya

Health Co-Benefit/Co–Harm (Adaption/Mitigation):

specification of beneficial or harmful impacts to health resulting from efforts to reduce or cope with greenhouse gases

A focus of content

Health Impact:

specification of health effect or disease related to climate change exposure

Health Outcome Unspecified

Intervention:

strategy to prepare for or reduce the impact of climate change on health

A focus of content

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Adaptation

Population of Concern: A focus of content

Resource Type:

format or standard characteristic of resource

Research Article

Resilience:

capacity of an individual, community, or institution to dynamically and effectively respond or adapt to shifting climate impact circumstances while continuing to function

A focus of content

Timescale:

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content